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National Eutrophication Survey, Las Vegas, Nev

Prepared for

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Feb 77

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NATIONAL EUTROPHICATION SURVEY

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REPORT
ON
POMME DE TERRE RESERVOIR
POLK AND HICKORY COUNTIES
MISSOURI
EPA REGION VII
WORKING PAPER NO. 540

WITH THE COOPERATION OF THE
MISSOURI DEPARTMENT OF NATURAL RESOURCES
AND THE
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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT ON POMME DE TERRE RESERVOIR
POLK AND HICKORY COUNTIES, MISSOURI
EPA REGION VII

by

National Eutrophication Survey

Water and Land Monitoring Branch
Monitoring Applications Laboratory
Environmental Monitoring & Support Laboratory
Las Vegas, Nevada

and

Eutrophication Survey Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

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February 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Missouri Department of Natural Resources for professional involvement, to the Missouri National Guard for conducting the tributary sampling phase of the Survey, and to those Missouri wastewater treatment plant operators who provided effluent samples and flow data.

The staff of the Missouri Department of Natural Resources, James Wilson, Director; the Division of Environmental Quality, Ken Karch, Director; and the Water Quality Program, James Odendahl, Director, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper series.

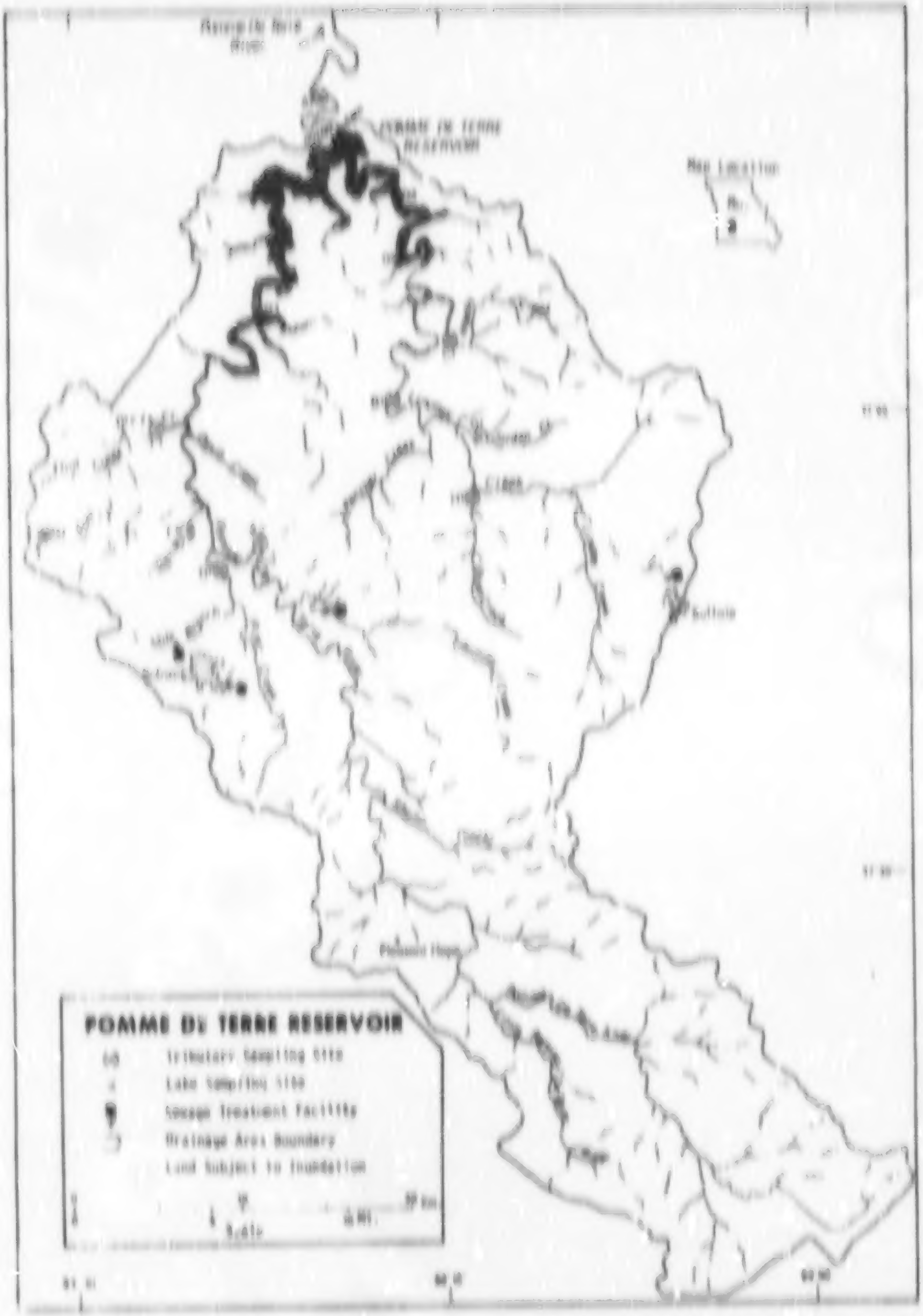
Major General Charles M. Kiefner, the Adjutant General of Missouri, and Project Officer Captain Donald L. Wellen, who directed the volunteer efforts of the Missouri National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF MISSOURI

LAKE NAME	COUNTY
Clearwater Lake	Reynolds
Pomme de Terre Reservoir	Polk, Hickory
Stockton Reservoir	Dade, Polk, Cedar
Lake Taneycomo	Taney
Thomas Hill Reservoir	Macon, Randolph
Lake Wappapello	Wayne, Butler

Pomme De Terre River
POMME DE TERRE RESERVOIR
Map Location
Mo.
Buffalo
Pleasant Hope
POMME DE TERRE RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Land Subject to Inundation
Scale
Km.
Mi.

REPORT ON POMME DE TERRE RESERVOIR, MISSOURI

STORET NO. 2902

I. CONCLUSIONS

A. Trophic Condition:*

Based upon field observations and Survey data, Pomme de Terre Reservoir is considered eutrophic, i.e., nutrient rich and highly productive. Whether such nutrient enrichment is to be considered beneficial or deleterious is determined by its actual or potential impact upon designated beneficial water uses of each lake.

Chlorophyll _a_ values ranged from a low of 2.2 µg/l to a high of 20.9 µg/l in the summer with a mean of 11.0 µg/l. Low Secchi disc visibility (mean 127 cm) and high potential for primary productivity, as measured by algal assay control yield, were reported. Of the six Missouri lakes sampled in 1974, one had greater median total phosphorus levels, three had greater median inorganic nitrogen values, and one had greater median dissolved orthophosphorus levels than Pomme de Terre Reservoir.

The Missouri Department of Natural Resources (manuscript) reports that the dissolved oxygen in Pomme de Terre Reservoir often depletes in the hypolimnion during summer stratification, resulting in production of hydrogen sulfide in the lower reaches

*See Appendix E.

of the lake. Survey limnologists reported no problem algal blooms or macrophyte growths during their visits to the lake.

B. Rate-Limiting Nutrient:

Algal assay results indicate that Pomme de Terre Reservoir was limited by available phosphorus levels. Spikes with phosphorus or nitrogen and phosphorus simultaneously resulted in increased assay yields. Addition of nitrogen alone did not stimulate a growth response. The ratios of available nitrogen to orthophosphorus (N/P) in sampled waters further substantiate phosphorus limitation.

C. Nutrient Controllability:

1. Point sources -

Point sources contributed 34.3% of the total phosphorus load to Pomme de Terre Reservoir. The city of Bolivar wastewater treatment plant contributed 23.6% of the total load, and the city of Buffalo contributed 6.7%.

The calculated phosphorus loading of 0.66 g $P/m^2/yr$ to Pomme de Terre Reservoir is about twice the loading proposed by Vollenweider (1975) for an oligotrophic lake and slightly above the eutrophic load. Reduction of phosphorus loading from known point sources would drop loading to below Vollenweider's eutrophic loading and be expected to improve the water quality of Pomme de Terre Reservoir.

2. Nonpoint sources -

The total phosphorus load from nonpoint sources accounted for 65.7% of the load reaching Pomme de Terre Reservoir. The Pomme de Terre River contributed 46.5% while minor tributaries and immediate drainage contributed 4.6% of the total.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake morphometric data were provided by the Missouri Clean Water Commission. Tributary flow data were provided by the Missouri District Office of the U.S. Geological Survey (USGS). Outlet drainage area includes the lake surface area. Mean hydraulic retention time was obtained by dividing the lake volume by the mean flow of the outlet. Precipitation values are estimated by methods as outlined in National Eutrophication Survey (NES) Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:

1. Surface area: 31.65 km^2.
2. Mean depth: 9.5 meters.
3. Maximum depth: 24.1 meters.
4. Volume: 300.675 x 10^6 m^3.
5. Mean hydraulic retention time: 314 days.

B. Tributary and Outlet:
(See Appendix B for flow data)

1. Tributaries -

Name	Drainage area(km^2)	Mean flow (m^3/sec)
A-2 Pomme de Terre River	714.8	4.97
B-1 Lindley River	297.8	2.60
E-1 Dry Fork Creek	77.7	0.45
Minor tributaries and immediate drainage -	470.8	3.79
Totals	1,561.1	11.81

2. Outlet - A-1 Pomme de Terre River 1,592.8 11.07

C. Precipitation:

1. Year of sampling: 110.8 cm.
2. Mean annual: 99.8 cm.

III. LAKE WATER QUALITY SUMMARY

Pomme de Terre Reservoir was sampled three times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five stations on the lake (Station 05 was sampled only twice) and from a number of depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first and last visits, 18.9-liter depth-integrated samples were composited for algal assays. Maximum depths sampled were 22.9 meters at Station 01, 19.5 meters at Station 02, 9.1 meters at Station 03, 12.2 meters at Station 04, and 3.0 meters at Station 05. For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in III-B. Results of the limiting nutrient study are presented in III-C.

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PHYSICAL AND CHEMICAL CHARACTERISTICS

		([illegible])				([illegible])				([illegible])		
		S*** = [illegible]		MAX DEPTH RANGE (METERS)		S*** = [illegible]		MAX DEPTH RANGE (METERS)		S*** = [illegible]		MAX DEPTH RANGE (METERS)
PARAMETER	N*	RANGE	MEDIAN		N*	RANGE	MEDIAN		N*	RANGE	MEDIAN	
TEMPERATURE (DEG CENT)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
DISSOLVED OXYGEN (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CONDUCTIVITY (UMHOS)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
PH (STANDARD UNITS)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
TOTAL ALKALINITY (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
TOTAL P (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
DISSOLVED ORTHO P (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
NO2+NO3 (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
AMMONIA (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
KJELDAHL N (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]
SECCHI DISC (METERS)												
	[illegible]	[illegible]	[illegible]		5	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	

* N = NO. OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT EACH SITE
*** S = NO. OF SITES SAMPLED ON THIS DATE

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/08/74	1. Melosira	1,524
	2. Stephanodiscus	1,001
	3. Cryptomonas	334
	4. Euglena	333
	5. Chlamydomonas	238
	Other genera	285
	Total	3,715
06/20/74	1. Aphanizomenon	887
	2. Cyclotella	887
	3. Carteria	493
	4. Cryptomonas	444
	5. Chroomonas	394
	Other genera	1,677
	Total	4,782
10/08/74	1. Melosira	1,233
	2. Dactylococcopsis	596
	3. Chroomonas	340
	4. Crucigenia	256
	5. Scenedesmus	170
	Other genera	596
	Total	3,191

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (ug/l)
04/08/74	01	6.8
	02	8.6
	03	14.2
	04	8.6
	05	----
06/20/74	01	13.2
	02	11.9
	03	2.2
	04	4.5
	05	20.9
10/08/74	01	6.8
	02	5.0
	03	8.3
	04	6.4
	05	18.6

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. 04/08/74 - Stations 01-04

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.020	0.645	8.1
0.05 P	0.070	0.645	18.8
0.05 P + 1.0 N	0.070	1.645	21.7
1.00 N	0.020	1.645	8.7

b. 10/08/74 - Stations 01, 04, 05

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.020	0.156	2.1
0.05 P	0.070	0.156	6.1
0.05 P + 1.0 N	0.070	1.156	16.7
1.00 N	0.020	1.156	1.7

c. 10/08/74 - Stations 02, 03

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.033	0.131	1.8
0.05 P	0.083	0.131	4.1
0.05 P + 1.0 N	0.083	1.131	16.2
1.00 N	0.033	1.131	1.6

2. Discussion -

The control yields of the assay alga, *Selenastrum capricornutum*, indicate that the potentials for primary production at the times of sampling were high on Pomme de Terre Reservoir. Increased growth of the test alga in response to an addition of orthophosphorus indicates that the lake was limited by phosphorus during the spring and fall sampling. Spikes with nitrogen and orthophosphorus simultaneously resulted in maximum yield. The addition of nitrogen alone did not stimulate a growth beyond the control yield.

The N/P ratios in sampled waters of 30/1 in the spring, 16/1 in the summer, and 29/1 in the fall further indicate phosphorus limitation (an N/P ratio of 14/1 or greater generally reflects phosphorus limitation).

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Missouri National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of May and June when two samples were collected. Sampling was begun in September 1974, and was completed in August 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Missouri District Office of the USGS for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a USGS computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) were estimated by using the mean annual nutrient loads, in kg/km^2/yr, in Dry Creek Fork at Station E-1, and multiplying the means by the ZZ area in km^2.

The operator of the Bolivar wastewater treatment plant provided monthly effluent samples and corresponding flow data. Nutrient loads for the Buffalo, Prairie Height Subdivision, and Quail Creek Mobile Home Park wastewater treatment plants were estimated at 1.134 kg P and 3.401 kg N/Capita/yr.

A. Waste Sources:

1. Known municipal -

Name	Population Served	Treatment	Mean Flow ($m^3/d \times 10^3$)	Receiving Water
Bolivar	5,300	Trickling filter†	2.598	Piper Creek
Buffalo*	1,220	Trickling filter	0.462**	Lindley Creek
Prairie Heights Subdivision***	397	Stabilization pond	0.150**	Mile Branch/ Piper Creek
Quail Creek Mobile Home Park***	333	Stabilization pond	0.126**	Hominy Creek/ Pomme de Terre River

2. Known industrial - None

*U.S.EPA, 1971.

**Estimated at 0.3785 m^3/capita/day.

***Missouri Department of Natural Resources (manuscript).

†Trickling filter first three months, oxidation ditch after that time.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 Pomme de Terre River	9,670	46.5
B-1 Lindley River	2,295	11.0
E-1 Dry Fork Creek	175	0.8
b. Minor tributaries and immediate drainage (nonpoint load) -	940	4.5
c. Known municipal STP's -		
Bolivar	4,905	23.6
Buffalo	1,385	6.7
Prairie Heights Subdivision	450	2.2
Quail Creek Mobile Home Park	380	1.8
d. Septic tanks* -	25	0.1
e. Known industrial - None		
f. Direct precipitation** -	555	2.7
Totals	20,780	100.0

2. Output - A-1 Pomme de Terre River	12,680
3. Net annual P accumulation -	8,100

*Estimate based on 50 lakeside residences, 1 park, and 6 camps.
**Estimated (see NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 Pomme de Terre River	289,920	47.8
B-1 Lindley River	132,930	21.9
E-1 Dry Fork Creek	18,630	3.1
b. Minor tributaries and immediate drainage (nonpoint load) -	112,990	18.6
c. Known municipal STP's -		
Bolivar	10,775	1.8
Buffalo	4,160	0.7
Prairie Heights Subdivision	1,330	0.2
Quail Creek Mobile Home Park	1,130	0.2
d. Septic tanks* -	990	0.2
e. Known industrial - None		
f. Direct precipitation** -	34,170	5.6
Totals	607,035	100.0

2. Output - A-2 Pomme de Terre River 433,540

3. Net annual N accumulation - 173,495

---

*Estimate based on 50 lakeside residences, 1 park, and 6 camps.
**Estimated (see NES Working Paper No. 175).

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Pomme de Terre River	14	406
Lindley River	8	446
Dry Fork Creek	2	240

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P (mg/l)	Mean Total N (mg/l)
C-1 Ingalls Creek	0.019	1.209
D-1 Piper Creek	0.727	1.767
F-1 Abels Branch	0.036	1.334
G-1 Jordan Creek	0.019	1.137
H-1 Brush Creek	0.021	1.297

Nutrient concentrations in tributary D-1, Piper Creek, appear greatly inflated when compared to the other ungaged tributaries to Pomme de Terre Reservoir. This inflation is probably a result of impaction from the Bolivar and Prairie Heights Subdivision sewage treatment plants upstream.

F. **Yearly Loadings:**

In the following table, the existing phosphorus annual loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his eutrophic loading is that at which the receiving waters would become eutrophic or remain eutrophic; his oligotrophic loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between eutrophic and oligotrophic.

Note that Vollenweider's model may not apply to lakes with short hydraulic retention times or in which light penetration is severely restricted by high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Pomme de Terre Reservoir	0.66
Vollenweider's eutrophic loading	0.64
Vollenweider's oligotrophic loading	0.32

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A
CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107 x 10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR MISSOURI 10/31/77

LAKE CODE 2902 POMME DE TERRE RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ MI) 1592.0

TRIBUTARY	SUB-DRAINAGE AREA(SQ MI)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
		NORMALIZED FLOWS(CFS)												
2902A1	1592.0	9.51	14.22	19.40	19.80	24.92	7.44	4.00	2.75	4.02	7.59	8.04	11.39	11.07
2902A2	724.8	4.60	6.23	8.58	8.79	9.36	4.25	3.96	2.41	3.40	3.31	3.04	2.46	4.97
2902B1	287.0	2.30	2.41	5.35	4.39	4.45	1.73	1.50	0.34	1.38	2.55	2.15	2.63	2.60
2902C1	77.7	0.20	0.51	0.46	0.79	1.02	0.51	0.51	0.12	0.27	0.25	0.17	0.18	0.45
2902ZZ	502.5	3.17	4.45	6.81	6.57	6.97	3.06	2.65	1.38	2.35	2.99	2.55	2.46	3.78

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 1592.0 TOTAL FLOW IN = 141.95
SUM OF SUB-DRAINAGE AREAS = 1592.0 TOTAL FLOW OUT = 132.46

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2902A1	9	74	12.420	14	24.733				
	10	74	3.171	19	3.115				
	11	74	49.659	8	3.288				
	12	74	26.123	14	29.450				
	1	75	17.640	26	3.540				
	2	75	58.600	22	25.011				
	3	75	66.376	15	66.376				
	4	75	23.500	19	1.440				
	5	75	1.246	3	1.218	17	1.303		
	6	75	3.720	7	1.189	21	2.124		
	7	75	4.021	19	1.440				
	8	75	1.303	23	1.303				
2902A2	9	74	3.115	14	1.600				
	10	74	1.614	19	1.442				
	11	74	19.227	8	18.421				
	12	74	7.844	14	11.713				
	1	75	10.370	26	3.511				
	2	75	27.280	22	110.439				
	3	75	31.725	15	31.146				
	4	75	5.900	19	4.248				
	5	75	6.347	3	6.779				
	6	75	2.577	7	1.416	21	1.133		
	7	75	5.481	19	0.300				
	8	75	1.409	23	0.281				

[illegible] [illegible]

LAKE CODE [illegible] POMME DE TERRE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
[illegible]	9	74	[illegible]	15	[illegible]				
	10	74	[illegible]	19	[illegible]				
	11	74	[illegible]	9	[illegible]				
	12	74	[illegible]	14	[illegible]				
	1	75	[illegible]	20	[illegible]				
	2	75	[illegible]	22	[illegible]				
	3	75	[illegible]	15	[illegible]				
	4	75	[illegible]	14	[illegible]				
	5	75	[illegible]	3	[illegible]	17	[illegible]		
	6	75	[illegible]	7	[illegible]	21	[illegible]		
	7	75	[illegible]	14	0.0				
	8	75	[illegible]	23	0.0				
[illegible]	9	74	[illegible]	14	[illegible]				
	10	74	[illegible]	19	[illegible]				
	11	74	[illegible]	9	[illegible]				
	12	74	[illegible]	14	[illegible]				
	1	75	[illegible]	20	[illegible]				
	2	75	[illegible]	22	[illegible]				
	3	75	[illegible]	15	[illegible]				
	4	75	[illegible]	19	[illegible]				
	5	75	[illegible]	3	[illegible]	17	[illegible]		
	6	75	[illegible]	7	[illegible]	21	[illegible]		
	7	75	[illegible]	19	[illegible]				
	8	75	[illegible]	23	[illegible]				
[illegible]	9	74	[illegible]						
	10	74	[illegible]						
	11	74	[illegible]						
	12	74	[illegible]						
	1	75	[illegible]						
	2	75	[illegible]						
	3	75	[illegible]						
	4	75	[illegible]						
	5	75	[illegible]						
	6	75	[illegible]						
	7	75	[illegible]						
	8	75	[illegible]						

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 79/[illegible]

213201
37 53 56.0 093 19 56.0 3
POMME DE TERRE RESERVOIR
29085 MISSOURI
090401

/TYPA/AMBNT/LAKE

11EPALES 2[illegible]
0010 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
[illegible]	15 00	0000	18.4		35	188	7.46	130	0.110	0.600	0.640	0.024
	15 00	0005	18.4	6.4		188	7.40	100	0.070	0.500	0.650	0.023
	15 00	0015	18.4	5.6		186	7.00	106	0.100	0.500	0.660	0.024
	15 00	0040	18.4	4.6		186	7.03	98	0.072	0.500	0.640	0.022
	15 00	0075	18.4	0.2		184	7.00	97	0.076	0.400	0.630	0.022
[illegible]	15 10	0000	26.3	10.4	108	250	8.41	120	0.150	1.200	0.140	0.026
	15 10	0005	26.4	11.2		247	8.42	120	0.260	0.500	0.110	0.010
	15 10	0015	25.6	10.4		244	8.40	109	0.050	0.500	0.090	0.007
	15 10	0020	25.3	4.6		242	8.45	108	0.040	0.400	0.090	0.007
	15 10	0025	24.1	3.4		242	7.72	100	0.050	0.400	0.290	0.004
	15 10	0030	21.6	3.0		225	7.60	110	0.060	0.400	0.390	0.014
	15 10	0040	20.4	2.3		220	7.68	116	0.050	0.300	0.560	0.007
	15 10	0045	17.1	0.2		211	7.30	108	0.060	0.400	0.650	0.008
	15 10	0050	13.8	0.6		193	7.32	105	0.020K	0.400	0.540	0.003
[illegible]	15 10	0000	19.2	6.0	84	212	8.05	119	0.070	0.500	0.170	0.007
	15 10	0005	18.4	6.8		209	8.00	116	0.060	0.200K	0.160	0.005
	15 10	0015	18.4	6.4		207	7.45	116	0.070	0.200K	0.150	0.006
	15 10	0025	17.3	6.2		206	7.46	114	0.073	0.200K	0.160	0.005
	15 10	0040	17.3	6.4		205	7.48	115	0.070	0.200K	0.160	0.005
	15 10	0052	18.3	6.2		206	7.49	115	0.060	0.200K	0.160	0.006
	15 10	0064	17.4	3.6		211	7.71	121	0.340	0.400K	0.110	0.014

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 79/02/26                                   290281
                                                                 37 53 58.0 093 18 58.0 3
                                                                 POMME DE TERRE RESERVOIR
                                                                 29085   MISSOURI
                                                                                     090481

/TYPA/AMBNT/LAKE                                                 11EPALES           0480192
                                                                  0041 FEET  DEPTH  CLASS 00

                            00665      32217      00031
  DATE    TIME DEPTH  PHOS-TOT    CHLRPHYL    INCDT LT
  FROM     OF                         A       REMNING
   TO     DAY  FEET   MG/L P        UG/L      PERCENT

74/04/09 15 10 0000     0.057        6.0
         15 10 0005     0.052
         15 10 0015     0.051
         15 10 0040     0.053
         15 10 0075     0.054
74/06/20 15 10 0000     0.036       13.2
         15 10 0001                             50.0
         15 10 0005     0.030
         15 10 0009                              1.0
         15 10 0015     0.025
         15 10 0020     0.027
         15 10 0025     0.053
         15 10 0030     0.021
         15 10 0040     0.022
         15 10 0045     0.031
         15 10 0060     0.023
74/10/09 15 10 0000     0.024        6.0
         15 10 0005     0.025
         15 10 0015     0.022
         15 10 0025     0.027
         15 10 0040     0.026
         15 10 0052     0.031
         15 10 0064     0.065
```

STORET RETRIEVAL DATE 7[illegible]

294602
37 52 18.0 093 21 29.0 3
PUMME DE TERRE RESERVOIR
29[illegible] MISSOURI
[illegible]

/TYPA/AMBNT/LAKE

11EPALES 2140[illegible]
0045 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
74/06/09	15 30	0000	27.6		25	167	7.67	95	0.066	0.600	0.690	0.035
	15 30	0005	26.6	9.4		167	7.90	95	0.110	0.400	0.710	0.036
	15 30	0015	26.6	9.6		167	7.85	93	0.100	0.400	0.710	0.035
	15 30	0025	22.5	6.8		167	7.87	94	0.100	0.400	0.700	0.036
	15 30	0035	21.5	6.2		167	7.60	90	0.100	0.400	0.710	0.030
74/08/13	10 50	0000	24.1	9.2	72	257	8.71	130	0.060	0.600	0.130	0.005
	10 50	0005	24.0	4.4		256	8.75	131	0.040	0.400	0.160	0.003
	10 50	0015	23.1	7.0		261	8.21	129	0.240	0.600	0.190	0.011
	10 50	0040	19.6	6.6		238	7.40	130	0.044	1.500	0.440	0.007
	10 50	0050	15.5	0.2		230	7.08	135	0.300	0.900	0.350	0.014
	10 50	0064	14.6	0.2		223	8.00	136	0.270	0.400	0.360	0.014
74/10/07	15 30	0000	18.3	7.6	64	223	7.73	129	0.030	0.700	0.107	0.006
	15 30	0005	18.2	7.4		221	7.75	129	0.030	1.500	0.130	0.005
	15 30	0015	18.2	7.2		221	7.73	131	0.025	0.400	0.160	0.005
	15 30	0030	18.2	7.2		221	7.71	129	0.040	0.400	0.130	0.006
	15 30	0040	18.1	7.2		221	7.71	132	0.060	0.500	0.170	0.010

STORET RETRIEVAL DATE 79/02/06

240202
37 52 16.0 093 21 29.0 3
POMME DE TERRE RESERVOIR
29085 MISSOURI
090491

11EPALES 2441002
0041 FEET DEPTH CLASS 00

/TYPA/AMBNT/LAKE

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/04/09	15 30	0000	0.073	5.0	
	15 30	0005	0.072		
	15 30	0015	0.072		
	15 30	0035	0.074		
	15 30	0055	0.073		
74/06/03	10 40	0000	0.037	11.8	
	10 40	0001			50.0
	10 40	0005	0.035		
	10 40	0009			1.0
	10 40	0015	0.034		
	10 40	0040	0.041		
	10 40	0050	0.040		
	10 40	0064	0.076		
74/10/07	15 30	0000	0.034	5.6	
	15 30	0005	0.025		
	15 30	0010			1.0
	15 30	0015	0.073		
	15 30	0030	0.026		
	15 30	0040	0.030		

```
STORET RETRIEVAL DATE 79/05/29
                                                                         290203
                                                                         37 44 11.6 093 22 11.0 3
                                                                         POMME DE TERRE RESERVOIR
                                                                         29167   MISSOURI
                                                                                                  JAN(?)
/TYPA/AMBNT/LAKE                                                         11EPALES          2140202
                                                                          0015 FEET  DEPTH  CLASS 00

                     00010    00300    00077    00094     00400    00410    00610    00625    00630    00671
DATE     TIME DEPTH  WATER    DO       TRANSP   CNDUCTVY  PH       T ALK    NH3-NH4  TOT KJEL NO2&NO3  PHOS-DIS
FROM     OF          TEMP              SECCHI   FIELD              CACO3    TOTAL    N        N-TOTAL  ORTHO
TO       DAY  FEET   CENT     MG/L     INCHES   MICROMHO  SU       MG/L     MG/L     MG/L     MG/L     MG/L P

74/04/09 16 25 0000     11.7               25       225    6.27      137    0.070    0.700    0.700    0.014
         16 25 0005     11.5     11.0               225    6.31      140    0.050    0.400    0.670    0.013
         16 25 0015     11.4     10.6               227    6.31      140    0.050    0.500    0.660    0.013
         16 25 0025     11.4     11.0               226    6.30      140    0.050    0.500    0.670    0.014
74/06/21 11 45 0000     23.3      5.2      90       270    8.20      137    0.140    0.300    0.250    0.009
         11 45 0005     22.5      4.6               273    8.21      124    0.120    0.400    0.240    0.008
         11 45 0017     22.2      4.0               262    7.96      123    0.110    0.400    0.250    0.008
         11 45 0025     20.[illegible]      1.6               256    6.80      122    0.140    0.400    0.330    0.009
74/10/07 16 00 0000     17.3      7.6      26       239    7.87      140    0.110    1.000    0.070    0.008
         16 00 0005     17.3      7.4               241    7.89      145    0.100    0.400    0.060    0.015
         16 00 0015     17.2      7.6               238    7.87      144    0.120    0.400    0.060    0.008
         16 00 0030     17.0      7.2               239    7.85      145    0.120    0.400    0.050    0.010

                     00665    32217    00031
DATE     TIME DEPTH  PHOS-TOT CHLRPHYL INCDT LT
FROM     OF                   A        REMNING
TO       DAY  FEET   MG/L P   UG/L     PERCENT

74/04/09 16 25 0000     0.053     14.2
         16 25 0005     0.053
         16 25 0015     0.040
         16 25 0025     0.055
74/06/21 11 45 0000     0.040      2.2
         11 45 0005     0.040
         11 45 0009                          1.0
         11 45 0010     0.044
         11 45 0025     0.054
74/10/07 16 00 0000     0.046      6.3
         16 00 0001                         50.0
         16 00 0005     0.047                1.0
         16 00 0015     0.054
         16 00 0030     0.063
```

[illegible]

[illegible]

[illegible]
[illegible]
[illegible]
[illegible]

[illegible]
[illegible] FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
[illegible]	[illegible]	[illegible]	[illegible]		10	90	[illegible]	43	[illegible]	0.700	0.600	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]		83	[illegible]	79	0.090	0.500	0.540	0.020
	[illegible]	0015	[illegible]	[illegible]		76	[illegible]	76	[illegible]	0.500	0.570	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]		80	[illegible]	76	[illegible]	0.500	0.620	0.025
[illegible]	[illegible]	0000	[illegible]	[illegible]	72	252	[illegible]	119	0.070	0.700	0.120	0.005
	[illegible]	0005	[illegible]	[illegible]		252	[illegible]	125	0.040	0.400	0.030	0.005
	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	120	0.050	0.400	0.050	0.005
	[illegible]	0020	23.5	[illegible]		246	[illegible]	120	0.070	0.500	[illegible]	0.005
	[illegible]	0023	[illegible]	[illegible]		229	[illegible]	[illegible]	0.100	0.400	[illegible]	0.005
[illegible]	[illegible]	0000	[illegible]	[illegible]	40	201	[illegible]	114	[illegible]	0.300	[illegible]	[illegible]
	[illegible]	0005	[illegible]	[illegible]		201	[illegible]	113	0.120	0.300	[illegible]	0.007
	[illegible]	0015	[illegible]	[illegible]		202	7.95	113	0.120	0.200	[illegible]	0.007
	[illegible]	0027	[illegible]	[illegible]		202	[illegible]	115	0.140	0.200	[illegible]	[illegible]
	[illegible]	0040	[illegible]	[illegible]		203	7.48	123	0.230	0.500	0.120	[illegible]

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	0005	[illegible]		
	[illegible]	0015	[illegible]		
	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]			[illegible]
	[illegible]	0005	[illegible]		
	[illegible]	[illegible]	[illegible]		[illegible]
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]			[illegible]
	[illegible]	0005	[illegible]		
	[illegible]	[illegible]			[illegible]
	[illegible]	0015	[illegible]		
	[illegible]	[illegible]			[illegible]
	[illegible]	0027	[illegible]		
	[illegible]	0040	[illegible]		

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STORET RETRIEVAL DATE 79/02/26
                                                          270205
                                                          37 44 55.0 093 20 33.0 3
                                                          POMME DE TERRE RESERVOIR
                                                          29145   MISSOURI
                                                                              080442
/TYPA/AMBNT/LAKE
                                                          11EPALES             2111202
                                                           0000 FEET  DEPTH  CLASS 00

                     00010     00300     00077     00094     00400     00410     00610     00625     00630     00671
 DATE   TIME DEPTH   WATER      DO       TRANSP    CNDUCTVY   PH       T ALK    NH3+NH4-  TOT KJEL  NO2&NO3   PHOS-DIS
 FROM    OF           TEMP               SECCHI    FIELD               CACO3     N TOTAL     N      N-TOTAL    ORTHO
  TO    DAY  FEET     CENT      MG/L     INCHES    MICROMHO    SU       MG/L      MG/L      MG/L      MG/L     MG/L P

74/06/21 18 07 0000    26.2      7.6        36        265      8.57       125     0.050     1.000     0.066     0.006
         18 02 0005    25.7      7.4                  262      8.50       122     0.025     0.462     0.025     0.010
         18 02 0010    25.7      7.0                  262      8.30       124     0.040     0.600     0.020     0.009
74/10/08 16 45 0000    17.6      9.2        30        266      8.50       125     0.100     0.500     0.040     0.005
         16 45 0005    17.0      8.8                  254      8.40       126     0.070     0.300     0.030     0.004

                     00665     32217     00031
 DATE   TIME DEPTH  PHOS-TOT  CHLRPHYL  INCDT LT
 FROM    OF                      A      REMNING
  TO    DAY  FEET    MG/L P    UG/L     PERCENT

74/06/21 14 02 0000   0.041      28.9
         18 07 0005   0.071                 1.0
         18 07 0010   0.076
74/10/08 16 45 0000   0.056      16.5
         16 45 0001                        50.0
         16 45 0004                         5.0
         16 45 0005   0.050
         16 45 0008                         1.0
```

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

```
STORET RETRIEVAL DATE 77/02/09
                                                            2442041
                                                            37 55 05.0 093 19 45.0 4
                                                            POMME DE TERRE RIVER
                                                            29      11 HERMITAGE
                                                            POMME DE TERRE RES       040891
                                                            NRTH 1.5 MI BELOW POMME DE TERRE DAM
/TYPA/AMBNT/STREAM                                          11EPALES          0402080
                                                             0000 FEET  DEPTH  CLASS 00

                         00630     00625     00610     00671     00665
 DATE    TIME DEPTH NO2&NO3  TOT KJEL   NH3+NH4-  PHOS-DIS  PHOS-TOT
 FROM     OF        N-TOTAL     N       N TOTAL    ORTHO
  TO     DAY  FEET   MG/L      MG/L      MG/L     MG/L P    MG/L P

74/09/14 11 30       0.047     2.100     1.450     0.055     0.115
74/10/15 11 25       0.175     1.200     0.035     0.005     0.020
74/11/08 09 35       0.200     0.700     0.055     0.005     0.010
74/12/14 11 15       0.272     0.400     0.020     0.010     0.030
75/02/22 11 40       0.004K    1.100     0.004K    0.014     0.030
75/03/15 11 50       1.440     1.400     1.032     0.024     0.060
75/04/19 11 15       1.410     1.400     0.090     0.016     0.050
75/05/03 10 45       0.200     0.450     0.015     0.005K    0.025
75/05/17 11 35       0.220     0.500     0.040     0.005K    0.011
75/06/07 12 00       0.140     1.550     0.250     0.010     0.050
75/06/21 12 00       0.105     0.500     0.050     0.005     0.035
75/07/19 12 00       0.005     0.350     0.035     0.005K    0.020
75/08/23 12 30       0.020     0.550     0.015     0.005     0.050

 K VALUE KNOWN TO BE
 LESS THAN INDICATED
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41

STORET RETRIEVAL DATE 77/10/24

240092
37 48 57.0 093 22 24.0 4
POMME DE TERRE RIVER
29 7.5 POLK
TAPOMME DE TERRE RES 090409
JEFFERSON AREA ON HWY D 7.1 M NE BOLIVAR
11EPALES 2140330
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3+N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/09/24	14 13		0.136	0.400	0.010	0.010	0.035
74/10/19	13 15		0.090	0.900	0.065	0.025	0.050
74/11/09	10 25		1.120	1.300	0.345	0.025	0.030
74/12/14	11 10		0.736	1.700	0.015	0.010	0.030
75/01/26	11 00		0.256	1.470	0.040	0.005	0.010
	13 30		0.570	0.410	0.024	0.005	0.010K
75/02/22	11 70		1.490		0.090	0.072	
75/03/15	12 40		0.900	0.400	0.056	0.010	0.040
75/04/13	11 15		0.230	1.400	0.070	0.005K	0.020
75/05/13	11 15		1.720	0.350	0.075	2.350	0.350
75/05/17	13 20		0.195	0.500	0.000	0.005	0.020
75/06/07	11 30		0.244	2.200	0.090	0.011	0.070
75/06/21	12 30		0.470	0.700	0.170	0.050	0.110
75/07/19	11 30		0.410	0.650	0.025	0.015	0.240
75/08/23	13 45		0.230	1.300	0.015	0.015	0.110

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 77/09/14

298001
37 45 25.0 083 17 18.0 [illegible]
LICKING RIVER
21 [illegible] MAGOFFIN
[illegible]
[illegible] MI SE OF [illegible]
[illegible]
[illegible] FEET DEPTH [illegible]

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3+NH4- N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/09/15	10 30		0.150	1.100	0.010	0.020	0.046
74/10/19	13 30		0.032	1.100	0.025	0.045	0.010
74/11/09	10 30		0.620	0.700	0.080	0.035	0.240
74/12/14	11 25		0.720	0.900	0.020	0.025	0.050
75/01/26	11 00		2.50	0.640	0.016	0.025	0.030
75/02/22	11 04		2.300		0.072	0.090	
75/03/15	12 45		0.240	0.400	0.072	0.009K	0.010
75/04/19	11 30		0.020	0.700	0.045	0.010	0.030
75/05/03	10 15		0.140	0.450	0.030	0.020	0.040
75/05/17	10 00		0.090	1.400	0.230	0.010	0.040
75/06/07	11 00		0.165	3.700	0.095	0.035	0.060
75/06/21	13 30		0.300	0.750	0.130	0.055	0.104
75/07/19	14 00		0.010	1.150	0.060	0.030	0.050
75/08/23	14 15		0.115	2.300	0.055	0.040	0.280

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE [illegible]

[illegible]
37 47 23.0 [illegible] 14 45.0 4
INGALLS CREEK
29 [illegible]
[illegible]
[illegible]
[illegible]
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/09/25	11 05		0.040	1.100	0.033	0.020	0.015
74/10/19	11 10		0.016	0.450	0.015	0.010	0.012
74/11/09	10 00		0.304	1.100	0.150	0.020	0.016
74/12/14	11 40		0.336	1.300	0.025	0.010	0.010
75/01/25	11 30		0.112	0.700	0.016	0.005	0.010K
75/02/27	11 15		0.320	1.400	0.040		
75/03/15	12 30		0.240	0.420	0.076	0.004K	0.010
75/04/19	11 45		0.015	1.050	0.025	0.005K	0.010K
75/05/03	10 30		0.020	1.400	0.220	0.010	0.030
75/05/17	10 50		0.045	0.950	0.330	0.006	0.010
75/06/07	11 15		0.035	2.400	0.250	0.010	0.030
75/06/21	14 00		0.060	0.300	0.015	0.010	0.020
75/07/19	14 30		0.010	0.700	0.005	0.005	0.020
75/08/23	13 45		0.015	0.700	0.025	0.015	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE [illegible]                          240211
                                                           37 44 10.0 093 23 50.0 4
                                                           [illegible]
                                                           29         [illegible]
                                                           [illegible]
                                                           [illegible]
/TYPA/AMBNT/STREAM                                         11EPALES          [illegible]
                                                            0000 FEET  DEPTH  CLASS 00

                         00630      00625      00610      00671      00665
 DATE    TIME DEPTH   NO2&NO3   TOT KJEL    NH3+NH4-  PHOS-DIS   PHOS-TOT
 FROM     OF           N-TOTAL       N       TOTAL     ORTHO
  TO     DAY  FEET      MG/L       MG/L      MG/L      MG/L P     MG/L P

74/09/14 14 30          1.425      1.507     2.100      0.375      0.392
74/10/19 13 00          1.125      0.490     3.100      0.750      0.520
74/11/09 10 00          1.440      1.050     0.290      0.145      0.150
74/12/14 11 50          1.600      1.500     0.040      0.070      0.110
75/01/25 13 15          1.465      1.300     0.160      0.213      0.290
75/02/22 11 40          0.440      3.290     0.194                 0.675
75/03/15 12 30          1.720      1.100     0.072      0.090      [illegible]
75/04/19 13 00          1.500      1.350     0.025      0.440      0.500
75/05/03 11 30          0.895      0.780     0.150      0.085      0.820
75/05/17 13 00          1.575      0.490     0.070      0.560      0.500
75/06/07 12 00          2.300      1.150     0.000      0.900      0.900
75/06/21 12 50          2.100      0.550     0.045      0.040      0.440
75/07/19 13 45          4.300      1.350     0.430      2.300      2.400
75/08/23 14 10          5.400      7.400     0.045      2.500      2.500
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STORET RETRIEVAL DATE [illegible]
                                                            2A0811
                                                            37 44 35.0 082 26 10.0 [illegible]
                                                            [illegible]
                                                            25      [illegible]
                                                            [illegible]
                                                            [illegible]
[illegible]                                                 11EPALES            [illegible]
                                                             0000 FEET  [illegible]

                          00630    00625     00610     00671     00665
  DATE     TIME DEPTH  NO2&NO3  TOT KJEL  NH3+NH4-  PHOS-DIS  PHOS-TOT
  FROM      OF          N-TOTAL    N       TOTAL     ORTHO
   TO      DAY  FEET     MG/L     MG/L      MG/L     MG/L P    MG/L P

74/09/19 12 15          [illegible] [illegible] 0.105  0.005K    0.020
74/10/1? 12 15           0.016     0.700     0.045     0.010     0.010
74/11/0? 10 ?0           0.352     1.100     0.325     0.010     0.010
74/12/1? 12 00           0.24?     2.200     0.005K    0.005     0.020
75/01/2? 11 45           0.112     0.300     0.015     0.009     0.010K
75/02/22 11 45           0.304     1.400     0.044
75/03/15 12 25           0.190     0.905     0.026     0.008K    0.02?
75/04/19 12 30           0.017     0.750     0.050     0.005K    0.010K
75/05/03 11 30           0.015     0.500     0.050     0.005K    0.010K
75/05/17 12 30           0.015     1.150     0.200     0.005K    0.010K
75/06/07 12 30           0.010     1.400     0.270     0.010     0.030
75/06/21 13 00           1.200     0.700     0.195     0.050     0.050
75/07/19 12 30           1.305     0.450     0.025     0.005     0.050
75/08/23 13 00           0.010     1.130     0.020     0.010     0.040


 K VALUE KNOWN TO BE
 LESS THAN INDICATED
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STORET RETRIEVAL DATE [illegible]                                  [illegible]1
                                                                   37 41 37.0 [illegible] 25 22.0 2
                                                                   [illegible]
                                                                   [illegible]
/TYPA/AMBNT/STREAM                                                 [illegible]
                                                                   [illegible]
                                                                   0000 FEET  DEPTH  CLASS 00

                           00630     00625     00610     00671     00665
DATE    TIME DEPTH  NO2&NO3  TOT KJEL  NH3+NH4-  PHOS-DIS  PHOS-TOT
FROM     OF         N-TOTAL     N       N TOTAL   ORTHO
 TO     DAY  FEET    MG/L      MG/L      MG/L     MG/L P    MG/L P

74/09/1? 12 45        1.695     0.500     0.025     0.015     0.01?
74/10/1? 12 25        0.300     0.700     0.105     0.015     0.025
74/11/0? 10 40        2.400     0.600     0.190     0.025     0.025
74/12/1?              1.890     0.400     0.020     0.015     0.020
75/01/2? 1? 15        1.520     0.500     0.132     0.007     0.019K
75/02/2? 12 35        0.520     3.700     1.000
75/03/15 12 45        1.450     1.100     0.080     0.010     0.030
75/04/1? 13 00        1.450     1.900     0.055     0.010     0.020
75/05/03 11 55        0.800     2.000     0.155     0.045     0.040
75/05/17 12 45        0.750     1.000     0.105     0.015     0.020
75/06/07 12 45        0.240     2.100     0.305     0.045     0.040
75/06/21 13 00        0.030     0.550     0.140     0.005     0.030
75/07/19 12 45        0.150     0.625     0.070     0.020     0.030
75/08/23 13 30        0.025     0.400     0.050     0.025     0.100

 K VALUE KNOWN TO BE
 LESS THAN INDICATED
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STORET RETRIEVAL DATE 77/10/24
                                                          240261
                                                         37 44 15.0 093 13 25.0 4
                                                         JORDAN CREEK
                                                         29      7.5 BUFFALO
                                                         LAFOURCHE DE TERRE RES      091041
                                                         SEC RD BRDG 1.2 MI N JCT WITH HWY P
/TYPA/AMBNT/STREAM                                        11EPALES              0400384
                                                          3000 FEET  DEPTH  CLASS 00

                          00630     00625     00610     00671     00665
 DATE     TIME DEPTH  NO2&NO3   TOT KJEL  NH3+NH4-  PHOS-DIS  PHOS-TOT
 FROM      OF          N-TOTAL     N       N TOTAL    ORTHO
  TO      DAY  FEET     MG/L      MG/L      MG/L     MG/L P    MG/L P

74/09/14 10 00          1.052     1.100     0.020     0.010     0.210
74/10/29 12 30          0.040     0.700     0.105     0.010     0.015
74/11/06 09 30          0.540     1.050     0.445     0.017     0.020
74/12/16 11 05          0.520     1.200     0.020     0.015     0.030
75/01/28 12 05          0.375     1.400     0.010     0.005K    0.010
75/02/22 11 30          0.336     1.300     0.040
75/03/15 12 00          0.410     1.450     0.040     0.050     0.030
75/04/19 11 00          0.155     1.200     0.035     0.005K    0.010K
75/05/03 09 45          0.100     0.450     0.170     0.010     0.010
75/05/17 10 30          0.090     0.675     0.200     0.005     0.015
75/06/07 10 20          0.015     1.000     0.070     0.010     0.030
75/06/21 13 15          0.005     0.300     0.075     0.010     0.020

  K VALUE KNOWN TO BE
  LESS THAN INDICATED
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STORET RETRIEVAL DATE [illegible]

/TYPA/AMBNT/STREAM

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                                       290241
                                       37 42 18.0 0[illegible] 17 50.0 2
                                       MARSH CREEK
                                       29      [illegible] BUFFALO MO
                                       [illegible]                [illegible]
                                       [illegible]
                                       11EPALES             2140386
                                        0000 FEET  DEPTH  CLASS 00
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			00630	00625	00610	00671	00665
DATE FROM TO	TIME OF DAY	DEPTH FEET	NO2&NO3 N-TOTAL MG/L	TOT KJEL N MG/L	NH3+NH4 TOTAL MG/L	PHOS-DIS ORTHO MG/L P	PHOS-TOT MG/L P
74/09/24	14 55		0.152	1.100	0.025	0.005	0.010
74/10/19	13 40		0.040	1.100	0.080	0.005	0.015
74/11/09	10 45		0.610	1.200	0.345	0.015	0.020
74/12/14	11 25		0.570	1.400	0.020	0.010	0.025
75/01/26	14 50		0.272	0.500	0.016	0.009	0.010
75/02/22	11 00		0.320	2.350	0.084		
75/03/15	13 10		0.470	0.900	0.072	0.005K	0.020
75/04/19	12 45		0.075	1.000	0.025	0.005K	0.020
75/05/03	13 00		0.040	0.500	0.035	0.005	0.010
75/05/17	13 50		0.055	0.700	0.050	0.005K	0.020
75/06/07	11 00		0.025	2.100	0.100	0.005	0.020
75/06/21	13 30		0.045	0.400	0.030	0.010	0.020
75/07/19	13 00		0.020	0.050	0.050	0.010	0.030
75/08/25	13 40		0.040	1.050	0.150	0.010	0.045

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE [illegible]
                                                                      [illegible]          [illegible]      [illegible]
                                                                     37 36 50.0 083 23 40.0 4
                                                                     [illegible]
                                                                     [illegible]
                                                                     [illegible]
                                                                     PIPER CREEK
[illegible]                                                          [illegible]               [illegible]
                                                                      0000 FEET  DEPTH  CLASS 00

                           00630     00625      00610      00671      00665      50051      50053
 DATE     TIME DEPTH    NO2&NO3   TOT KJEL     NH3+NH4-   PHOS-DIS   PHOS-TOT    FLOW      CONDUIT
 FROM      OF            N-TOTAL      N         TOTAL      ORTHO                  RATE     FLOW-MGD
  TO      DAY  FEET       MG/L       MG/L       MG/L      MG/L P     MG/L P    INST MGD    MONTHLY

74/12/10 00 00
CP(T)-                   4.460     12.500      0.330      2.400      4.250      1.040      0.820
74/12/10 24 00
75/01/15 00 00
CP(T)-                   1.360      2.000      0.365      2.700      4.200      0.675      0.780
75/01/15 24 00
75/02/12 11 30
CP(T)-                   1.440      1.400      0.370      2.350      2.400      0.820      0.780
75/02/13 11 30
75/03/05 09 30
CP(T)-                   4.440      4.600      0.080K     2.200      3.000      1.290      0.450
75/03/06 09 30
75/04/08 09 00
CP(T)-                   1.440      2.090      0.250                 4.700      0.480      0.425
75/04/09 09 00
75/05/08 09 00
CP(T)-                   3.700      2.400      0.050K     6.520      6.700      0.670      1.043
75/05/09 09 00
75/06/03 10 00
CP(T)-                  21.000      1.500      0.082      8.700      9.090      0.422      0.592
75/06/04 09 00
75/08/05 10 00
CP(T)-                  21.000      2.300      0.050K     6.400      6.400      0.515      0.500
75/08/06 10 00
75/09/04 10 30
CP(T)-                   6.000      7.300      0.025      6.900      7.250      0.590      0.590
75/09/05 10 30
75/10/09 00 00
CP(T)-                  13.000      3.000      0.075      4.350      4.450      0.563      0.575
75/10/09 24 00
75/11/04 10 30
CP(T)-                  22.000      2.500      0.025K     8.000      8.900      0.557      0.575
75/11/05 10 30
75/12/04 10 00
CP(T)-                  12.600      1.700      0.025K     4.000      5.100      0.700      0.550
75/12/05 10 00

 K VALUE KNOWN TO BE
 LESS THAN INDICATED
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STORET RETRIEVAL DATE 77/02/24                                   [illegible]        [illegible]       [illegible]
                                                                 37 36 50.0 093 23 40.0 4
                                                                 BOLIVAR
                                                                 29      7.5 BOLIVAR
                                                                 [illegible] [illegible] [illegible]    [illegible]
                                                                 PIPER CREEK
                                                                 11EPALES                  [illegible]
/TYPA/AMBNT/STREAM                                                0000 FEET  DEPTH  CLASS 00

                        00630    00625    00610    00671    00665    50051    50053
  DATE   TIME DEPTH  NO2&NO3  TOT KJEL   NH3+NH4- PHOS-DIS PHOS-TOT   FLOW   CONDUIT
  FROM    OF         N-TOTAL     N       TOTAL    ORTHO              RATE   FLOW-MGD
   TO    DAY  FEET    MG/L      MG/L     MG/L     MG/L P   MG/L P  INST MGD MONTHLY

75/12/16 2? ??
CP(T)-                  5.400    0.750    4.050    5.300    3.200    0.525    0.720
75/12/31 ?? ??
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APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974

STATE OF MISSOURI

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[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]